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CONFIDENTIAL

25X1

January 22, 1958

Dear Sir:

This letter covers the report period from December 15, 1957, to January 15, 1958, on Task Order No. L.

During this period, modifications were made on the power-generating-equipment drive system and the automobile-engine governor-control system. The installation of the trencher transmission cable was completed, and trenching tests were made with both trenching units.

The power-generating-equipment drive which had been mounted on two base plates and then attached to the floor panel of the Volkswagen was removed and then re-attached with one base plate. This new mounting arrangement greatly reduced the vibration of the power-generating drive system by eliminating buckling of the automobile floor panel.

The engine-governor control linkage was permanently attached to the carburetor lever, and modifications were made to permit the alternate attachment of the accelerator linkage to the carburetor lever. The accelerator linkage is fastened to the carburetor lever for over-the-road operation of the automobile and can be manually disconnected from the carburetor lever when the power-generating equipment is to be used. The separation of the two linkages during operation of the power-generating equipment

CONFIDENTIAL

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January 22, 1958

is necessary in order for the governor to be able to maintain satisfactory speed control of the power generator.

The transmission line for the trencher is a 250-foot length of No. 10 three-conductor rubber-covered cable. This cable is wound on a 20-inch-diameter reel that is installed in the spare tire compartment of the Volkswagen. After the transmission cable was installed, additional trenching tests were made to a depth of 18 inches in soft clay, and the trenching rate obtained was approximately 34 inches per minute. Trenching tests were also made in ground that was frozen to a depth of approximately 6 inches. In these tests, the progress of the trencher unit was so erratic and the trenching rate was so low that no attempt was made to note the trenching rate obtained under these conditions. It appears that the trencher, equipped with teeth of the current design and with the current arrangement of these teeth on the chain, will not operate at a significant rate in frozen ground; this is attributed to the fact that the frozen ground is not broken up and subsequently removed by the teeth. It may be that with a relatively small effort, an improved design and arrangement of chain teeth could be developed; this problem is being considered.

The second power generator was ordered on December 20, 1957, and delivery is expected on or before March 20, 1958.

During the month of January, some trenching rate tests will be made if the condition of the ground will permit such tests. Brief noise-damping tests will also be made on the motor. The preparation of the summary report will be started.

-3-

January 22, 1958

The original appropriation on this Task Order was \$25,015. As of January 1, 1958, the unexpended balance was approximately \$4,500.

Sincerely,



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ABW:tr

In Duplicate



File: ASA, Enc 25X1

December 18, 1957

Dear Sir:

This letter covers the report period from November 15 to December 15, 1957, on Task Order No. L.

During this period, the installation of the power-generating equipment, electric clutch, mechanical governor, and related components in the Volkswagen was completed. Following the installation and testing of this equipment, preliminary trenching tests were conducted with the trencher unit.

The power-generating equipment, electric clutch, mechanical governor, and the power-generating-equipment enclosure with instruments and controls were installed in the back-seat compartment of the automobile. A trencher unit was then operated from the power-generating equipment in the automobile and preliminary trenching tests were run. However, the governor system for the Volkswagen engine lacked the sensitivity of speed control that is needed in order to permit maintaining the drive frequency of the trencher electric motor; consequently, trenching rates were not determined at this time.

The power-generating equipment is designed to operate from an engine speed of 1,200 rpm. During these tests, the performance of the engine appeared to be satisfactory and the associated noise

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December 18, 1957

level was not excessive. The trencher unit, which weighs 78-1/2 pounds with blade and chain, was easy to control and the operation of the unit is very encouraging. There is an objectionable high-pitch sound that originates in the gears of the trencher gearhead motor. It is believed that this noise can be reduced by using specially made gears in the gear box; this problem is being investigated.

During the coming month, modifications will be made on the power-generating-equipment drive system in an attempt to reduce vibration in the automobile when the unit is operating. Modifications are also to be made in the governor drive linkage, to increase the sensitivity of the speed control for the power generator. Following the modifications, trenching-rate tests will be made with the trencher units.

The original appropriation on this Task Order was \$25,015. As of December 1, 1957, the unexpended balance was approximately \$6,700.

Sincerely, /


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In Duplicate

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November 29, 1957*File ASA, & Co. Sig
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12/6/57
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Dear Sir:

This letter covers the report period from October 15 to November 15, 1957, on Task Order No. L.

During this period, the assembly of the two electric trencher units was completed. The power generator, two jack-shafts, and some of the electrical controls were installed in the Volkswagen automobile. The installation of the power-generating equipment is now about 80 per cent complete.

The 2-1/2-horsepower, 400-cycle electric motors and drive shafts for the electric trenchers were received from the manufacturer and were installed on the trencher units. The assembly of the electric trenchers was completed with the mounting of the manual clutch, the timing-belt drive, and the motor starter.

The power generator, two jack-shafts, and the timing-belt drive components were installed in the Volkswagen. The original automobile generator was relocated and is now driven from the No. 1 jack-shaft. The installation of the electric clutch and the mechanical governor, which are parts of the No. 2 jack-shaft of the drive system, has not been completed. Some of the electrical controls for the power generator have been mounted in the automobile, and the remaining components will be installed as a part of the power-generating-equipment enclosure.


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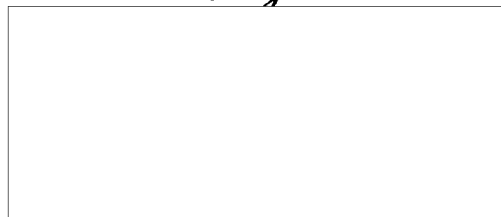
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November 29, 1957

During the coming month, the installation of the power-generating equipment will be completed. Also, it is expected that some field testing of this equipment and of the electric trencher will be started.

The original appropriation on this Task Order was \$25,015. As of November 1, 1957, the unexpended balance was approximately \$9,700.

Sincerely, 



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ABW:mjc

In Duplicate

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25X1

October 18, 1957

Dear Sir:

This letter covers the report period from September 15 to October 15, 1957, on Task Order No. L.

During this period, the Volkswagen automobile was modified for the installation of the power generator and related equipment. Fabrication was started on parts for the power transmission and two trenching chains were assembled, making a total of six chains on hand for testing the trenchers.

The power generator was placed in the Volkswagen automobile on a temporary basis. The installation of the power generator, clutch, and drive pulleys will require more space in the vehicle than had been anticipated. This is due partly to the complexity of the installation and partly to the fact that we ordered a standard generator which is larger than a modified generator. Approximately two-thirds of the back-seat space, plus space in the engine compartment of the automobile, will be needed to house the power generator, controls, and drive system as currently arranged.

The power-transmission system will consist of two jack-shafts, an electric clutch, and numerous pulleys, adapters, and brackets. The Volkswagen-engine generator-shaft assembly was removed so that one jack-shaft could be mounted in its place, to transmit power from the engine crankshaft to the generator drive system. The construction work on the drive components is about 50 per cent complete.

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October 18, 1957

Until recently, all trenching chains were fabricated as follows: The chain teeth were carburized to a depth of 0.030 inch and heat treated in a gas-fired furnace to a hardness of 55-60 Rockwell C. The chain-teeth pins were then welded to the chain teeth, and the chain teeth were assembled into trenching chains. Examination and tests of this chain showed a variation in tooth hardness from 25 to 60 Rockwell C after the welding operation and a noticeable difference in the wear rate of the teeth. Under Task Order No. R, Work Order No. 1, the method of making chain was improved. The chain-teeth pins were welded to the chain teeth and this assembly was carburized to a depth of 0.030 inch. The chain teeth were then heat treated in an electric furnace to a hardness of 58-60 Rockwell C and assembled into trenching chains. A cursory metallurgical examination and limited trenching tests of this chain indicated that the hardness of the teeth was more uniform and higher than that of the previously prepared teeth and, as a result, it is expected that the life of the new chain will be enhanced. Six sets of this improved chain have been prepared for the electric trenchers.

During the coming month, it is expected that the power generator, two jack-shafts, and related components of the power-generating unit will be assembled in the vehicle. Also, the assembly of the electric trenchers is expected to be completed during this period. The 400-cycle electric motors are scheduled for delivery during October, 1957.

The original appropriation on this Task Order was \$25,015. As of October 1, 1957, the unexpended balance was approximately \$11,600.

Sincerely,



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ABW:dp
In Duplicate

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*+ Mr. ASA, Elec. Div.
JWS*

25X1

August 27, 1957

Dear Sir:

This letter covers the report period from July 15 to August 15, 1957, on Task Order No. L.

During this period, there has been no work activity on this project. The scheduled rate of effort will be resumed when the power-generating equipment and related components are received. Delivery of this equipment is expected in September.

The original appropriation on this Task Order was \$25,015. As of August 1, 1957, the unexpended balance was approximately \$13,700.

Sincerely,

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ABW:dp

In Duplicate

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F. O. 71-71, - - -

Dig.

In replying please address:



25X1

August 19, 1957

Dear Sir:

Task Order No. L

In connection with the research being performed under Task Order No. L, it is necessary to procure two electric motors and two generators which satisfy the specialized requirements of the particular application as defined by the activity under this Task Order. Purchase of the required electric motors and generators has been approved by the Contracting Officer in the Schedule of Task Order No. L. This letter setting forth our procurement procedure in this instance is provided for your information.

*Rec'd 8/22
1600*

After the apparent requirements for the two different units were determined, we contacted, by telephone and/or letter, 10 manufacturers of electric motors and eight manufacturers of generators. It was found that a suitable unit of each type was available from only one manufacturer.

Westinghouse Electric Corporation markets a 2-1/2-horsepower Gearhead electric motor which provides a 1,250-rpm output speed, weighs about 15-1/2 pounds, operates on 220-volt, 3-phase, 400-cycle current,

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August 19, 1957

is fan cooled, has a motor speed of 7,600 rpm, and is for continuous duty. This motor is satisfactory for the application. A 2-1/2-horsepower motor that operates on 208-volt, 3-phase, 400-cycle current, weighs 8 pounds, and is for continuous duty is available from the Chicago Pneumatic Tool Company; however, this motor operates at a speed of 11,000 rpm. In order to use this unit in our application, it would be necessary to procure a speed reducer to be utilized in conjunction with this motor; the cost, size, and weight of the electric motor - speed reducer assembly would be greater than those, respectively, for the above-described Westinghouse motor. Allis-Chalmers, Louis-Allis Company, Leland Electric Company, Redbank Division of Bendix Air Associates, Jack and Haintz, Leece-Neville Company, and General Electric cannot furnish a suitable electric motor because their units are too heavy or too low in horsepower; or operate too fast, or on other than 400-cycle current, or on direct current. Some of these companies do not market an electric motor that satisfies any of the requirements.

A suitable generator is manufactured by the Motor Generator Corporation. This is a 5-kilowatt unit with a driven speed of 1,250 rpm and a total weight of approximately 200 pounds; it is marketed complete with a built-in direct-current exciter, a blower, and appropriate controls. Westinghouse Electric Corporation can furnish a generator which is satisfactory except for the fact that auxiliary exciter, cooling, and control equipments are not included in the unit. Louis-Allis Company, Master Vibrator Company, Robbins and Meyers, Redbank Division of Bendix,

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August 19, 1957

Chicago Pneumatic Tool Company, and Homelite Corporation cannot provide a suitable generator because their units are too small in capacity, are too heavy, are too high in output speed, and/or are not equipped with the needed controls.

In view of the above, it appears to be in the best interests of the Government to procure the needed electric motors and generators from the Westinghouse Electric Corporation and Motor Generator Corporation, respectively. To this end, purchase orders have been issued to these companies for two electric motors, at a total cost of approximately \$1,500, and for one generator, at a cost of approximately \$1,250. While only one of each unit is needed immediately, the cost of two motors was extremely favorable as compared to that for one (approximately \$1,300); consequently, both motors were ordered at the same time.

This procurement has been discussed generally with your technical representatives. Should you have any questions regarding our procedure in this instance, please let us know. You may direct your telephone inquiries to

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Very truly yours,

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JPT:dp

In Duplicate

cc: Project Monitor

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7/25/57
10 cc25X1
25X1

July 18, 1957

Dear Sir:

This letter report covers the activity on Task Order No. L for the period from June 15 to July 15, 1957.

During this period, the power-generating equipment was ordered, the design of the trenching unit was completed, assembly of the trenching unit was started, and chain teeth were prepared for the assembly of additional chains.

Quotations were received from four manufacturers of 400-cycle generators and from four manufacturers of 400-cycle electric motors. Based on these quotations and the suitability of the equipment, one 400-cycle generator with controls and two 400-cycle 2-1/2-horsepower gearhead motors were ordered, and delivery is expected within about 75 days. Only one generator and one motor are needed immediately, but the cost of two motors was extremely favorable. Therefore, we ordered the scheduled spare at this time.

The design of the trenching unit was completed and about 95 per cent of the parts have been built. The splined jack-shaft that will extend from the gearbox of the electric motor is being prepared by the motor manufacturer. Until this splined shaft is completed and the gearhead motor delivered, the trencher cannot be completely assembled. The assembly of

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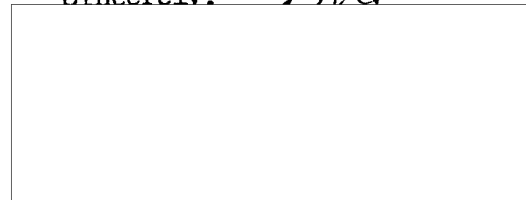
July 18, 1957

two additional digging chains was completed; this makes a total of four chains on hand for test purposes.

During the coming month, activity on this project will be reduced to a minimum. The scheduled rate of effort will be resumed when the power-generating equipment and related components are received.

The original appropriation on this Task Order was \$25,015. As of July 1, 1957, the unexpended balance was approximately \$14,900.

Sincerely, *h. S.*



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ABW/ba

In Duplicate

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FILE

ASA

ELECTRIC DIGGER

June 19, 1957

Rec'd ED
6/19
10:15

Dear Sir:

This letter report covers the activity on Task Order No. L for the period from May 15 to June 15, 1957.

During this period, a Volkswagen automobile was purchased, and 400-cycle power-generating equipment and a 400-cycle motor were selected for the electric trencher. The design of the trencher has been nearly completed and some trencher parts are under construction. Two trenching chains have been built and parts are being made for additional chains.

A 1956 Volkswagen sedan was purchased, and a preliminary study was made on the placement of the power-generating equipment in the automobile. It is planned that the 400-cycle generating equipment will occupy the modified storage space back of the rear seat; the power-generator shaft will be parallel to and driven from the Volkswagen engine-blower shaft.

After contacting seven manufacturers of 400-cycle motors and eight manufacturers of 400-cycle power-generating equipment, we selected a 400-cycle, 2-1/2-horsepower Gearhead motor and a 400-cycle, 5-kw generator for the electric power equipment. These components most nearly fulfilled the project requirements of size, weight, speed, and power. Although the equipment selected appears to be somewhat unique, four manufacturers each of 400-cycle motors and

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June 19, 1957

400-cycle power-generating equipment have been requested by letter to quote prices and delivery dates for this equipment based on the specifications set up in line with the project requirements.

The electric trencher will be similar in design to the gasoline-powered unit developed under Research Order No. 21. However, the nosepiece extension, back frame, and 18-inch blade have been redesigned to fit the new motor drive and transmission assembly. The design of the electric trencher is about 90 per cent complete and approximately 30 per cent of the parts for the trencher have been built.

Two trenching chains for an 18-inch blade have been assembled. Chain teeth and related parts are being prepared for six additional chains.

During the coming month, it is expected that one 400-cycle generator and two 400-cycle electric motors will be ordered. The design of the trenching unit will be completed, assembly of the trencher will be started, and work will be continued on the additional six chains.

The original appropriation on this Task Order was \$25,015. As of June 1, 1957, the unexpended balance was approximately \$17,400. *WES*

Sincerely,



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AEW:vh

In Duplicate

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May 15, 1957

5/20/57
9:00

Dear Sir:

This is the first letter report covering the activity on Task Order No. L for the period from April 15 to May 15, 1957.

During this period, arrangements were made to procure a Volkswagen automobile, and 400-cycle motors and power-generating equipment were investigated. Also, the fabrication of two trenching chains was started.

After confirming that a new 1957 Volkswagen would probably not be available for at least six months, we decided to purchase a used 1956 Volkswagen which was available for immediate delivery. Arrangements are being made for the purchase of this car.

An examination was made of 400-cycle power-generating equipment manufactured by the Motor Generator Corporation, Troy, Ohio. An investigation was also made of 400-cycle power-generating equipment and 400-cycle Gearhead electric motors manufactured by the Westinghouse Electric Corporation, Lima, Ohio. At least two other companies will be contacted before a choice of equipment will be made.

Parts are being made for two test trenching chains. These first two chains are being fabricated from 1/2-inch-pitch roller chain with special connecting-link assemblies of case-hardened cold-rolled-steel teeth and

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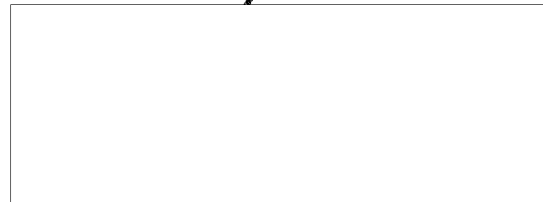
May 15, 1957

hardened pins. They will be identical to the chains used on Research Order No. 21.

During the coming month, the 400-cycle power-generating equipment and 400-cycle electric motor will be selected and ordered. Work on the chains will be completed, and a design layout of the trenching unit will be prepared.

The original appropriation on this Task Order was \$25,015. As of May 1, 1957, the unexpended balance was approximately \$22,650. *ms.*

Sincerely, ,



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In Duplicate

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2100File: Port. Trench Dig,
Electre.

May 8, 1957

Dear Sir:

It is necessary for us to acquire a Volkswagen (VW) to perform the research under Task Order No. L. Purchase of a Volkswagen has been approved by the Contracting Officer in the Schedule of the Task Order providing for this study. Delivery time for a new VW in either Columbus, New York City, or Washington, D. C., is at least 6 months from the date of placing the order.

One of our employees has a 1956 VW that he is willing to sell to us for project use for \$1,550. This automobile has been driven approximately 21,000 miles, but according to one of our engineers who has evaluated it and compared it to a newer Volkswagen, it is in good condition and well suited to the needs of the project.

The price of \$1,550 appears to be in line with the market price of used 1956 Volkswagens. We have a written quote from a [redacted] 25X1 of Columbus, Ohio, who advertised his 1956 VW for sale in The Ohio State Journal on May 6, 1957. [redacted] is asking \$1,695, not including sales 25X1 tax, for his VW, which has been driven about 5,700 miles. Local used car agencies were called regarding the price for used 1956 Volkswagens. Goody's Auto Sales of Columbus, Ohio, indicated that they had recently sold a 1956 VW with 21,000 miles for \$1,600. The telephone survey did show that used Volkswagens for sale were extremely scarce in the Columbus area.

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May 8, 1957

The Sunday edition (April 28) of the New York Times, in the classified section on used foreign and sports cars, attests to the current price in New York City for 1956 Volkswagens. Specifically, one auto agency is asking \$1,550 for a 1956 VW with 19,000 miles. This is comparable to the VW offered for sale by our employee. Of course, to purchase a car in New York City and then bring it to Columbus would involve additional costs and time. In addition, the VW exporter in New York was contacted and stated that a 1956 VW, used, should probably sell for \$1,500 and up.

Your technical representative has surveyed the four VW dealers in Washington, D. C., and feels that \$1,550 is a reasonable price for a 1956 VW. He felt that this, plus immediate delivery in Columbus, made the purchase from our employee a very favorable one.

Since the price of \$1,550 certainly appears to be in line with the current market price for used 1956 Volkswagens, the purchase from our employee appears to be in the best interest of the Government, especially in view of the fact that immediate delivery in Columbus can be obtained.

This procurement has been discussed with your representative by telephone. This letter setting forth our procurement procedure in this instance is provided for your files. Your confirmation and approval of our procedure in this instance will be appreciated.

Should you have any questions regarding this matter, please call

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Very truly yours,

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In Duplicate

cc: Project Monitor